Enhanced Jupiter™

DESCRIPTION

The Enhanced Jupiter Magnetostrictive level transmitter provides a 4–20 mA output proportional to the level being measured or FOUNDATION fieldbus™ output. Jupiter is available as an externally mounted model for use with Orion Atlas™, Gemini™, and Aurora® magnetic level indicators or as a direct insertion version for use in a wide variety of process vessels or external chambers.

A dual compartment design housing allows for separation of wiring and electronics and helps facilitate simple, easy installation and set-up for top, bottom, and direct insertion mount versions.

Jupiter supports the FDT/DTM standard and a PACTware PC software package allows for additional configuration and trending flexibility.

SIL 2

FEATURES

- Precision level measurement ±0.015" (.381 mm)
- Two-wire, loop-powered intrinsically safe and explosion proof level transmitter
- 4–20 mA output with HART®
- Optional FOUNDATION fieldbus™ output
- LCD with 3-key push-button standard
- High repeatability ±0.005" (0.127 mm)
- Multi-variable transmitter able to measure level, interface level and level & interface level
- Maximum Process temperatures
  Direct Insertion Model: +500° F (+260° C)
  External Mount: +850° F (+455° C)
- -40° to +160° F (-40° to +70° C) ambient operation
- Lengths to 400 inches (999 centimeters)
- Third Party Safety Integrity Level (SIL) data (FMEDA analysis) for Safety Instrument Systems engineering is available. HART® version is suitable for SIL 2 loops: Safe Failure Fraction (SFF) = 90.7%

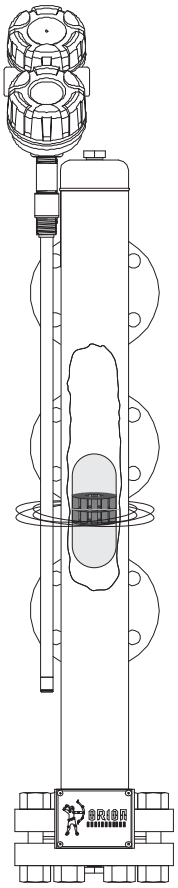
APPLICATIONS

- Separators
- Surge Tanks
- Gas Chillers
- Alkylation Units
- Interface
- Propane Vessels
- Process Vessels
- Storage Vessels
- Vacuum Tower Bottoms
- Batch Tanks

TECHNOLOGY

The Enhanced Jupiter transmitter utilizes the engineering principle of magnetostriction and the effect of a magnetic field on the magnetostrictive wire as the basis for operation of the instrument. The primary components are the probe assembly containing the wire and the electronics assembly.

A low energy pulse which is generated by the electronics travels the length of the magnetostrictive wire. A return signal is generated from the precise location where the magnetic field of the MLI float intersects the wire. A timer precisely measures the elapsed time between the generation of the pulse and the return of the mechanical or acoustic signal. This is detected by the acoustic sensor located below the cast aluminum electronics housing. The software is set up to interpret the time-of-flight data and to display and transmit the process variable data resulting from the measurement.

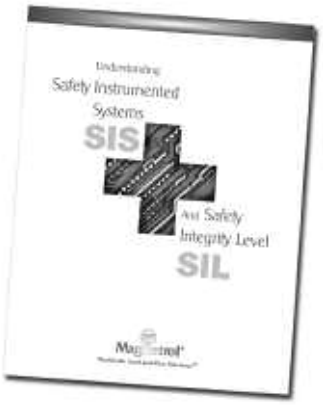


SAFETY INTEGRITY LEVELS 1 & 2

SIL is a device's Safety Integrity Level per IEC 61511. Because combined sensors can increase the SIL, it is often stated as "1 as 1oo1 / 2 as 1oo2," meaning: SIL 1 if the device is one-out-of-one used; SIL 2 if it is one-out-of-two devices used. A device suitable for SIL 2 as 1oo1 means a single device satisfies the SIL 2 requirement.

Orion's Enhanced Jupiter is the only magnetostrictive transmitter to achieve the SIL 2 as 1oo1 designation.

Refer to Magnetrol Bulletin 41-299 for more detailed information.



SIL Brochure

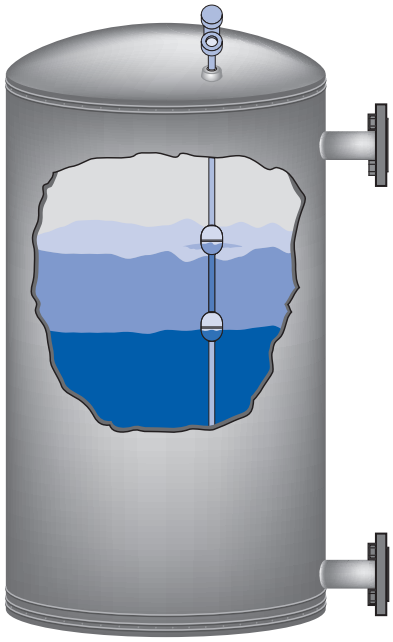
Jupiter	Models 20X/22X/24X		Model 26X	
SIL	1 as 1oo1		2 as 1oo1	
Instrument Type	B		B	
SFF	83.7%		90.7%	
PFDavg	9.60E-04		5.45E-04	
	FITS	**Annual**	**FITS**	**Annual**
Fail Dangerous Undetected	218	1.91E-03	123	1.08E-03
Fail Dangerous Detected	698	6.11E-03	793	6.95E-03
Safe	421	3.69E-03	413	3.62E-03

INTERFACE MEASUREMENT AND EMULSION LAYERS

The Enhanced Jupiter relies on a float that is specifically designed for the specific gravities of the two interfacing liquids. The float is weighted so that, in ideal conditions, the magnets will position themselves precisely at the location of the interface—even if a thick layer of foam is present above the upper liquid.

The presence of an emulsion layer, or "rag" layer, occurs when the two liquids have not completely separated from each other. This layer consists of a mixture of the two liquids, which can range in thickness from a few millimeters to several feet. The float will maintain its position within the emulsion layer without regard for how thick it is. This is an example of where magnetostrictive technology will provide superior performance over alternative devices.

With the Enhanced Jupiter, sophisticated interface level measurement is simple. New features allow two levels (total and interface) to be detected simultaneously and displayed on the transmitter's LCD. Via the keypad, HART or FOUNDATION Fieldbus, the user can select which level the output will track. You also have the option of utilizing a HART interface module to convert the second process variable to a separate 4-20 mA signal.



PACTWARE PC SOFTWARE PROGRAM

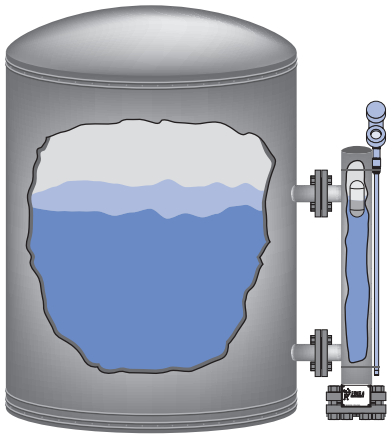
PACT***ware*** PC software and the new Field Device Tool (FDT) standard take magnetostrictive level measurement to a new degree of setup efficiency and user-friendliness. The powerful Enhanced Jupiter magnetostrictive transmitter with its linear program has always been easy to use. PACT***ware*** builds on that ease of use by adding a graphical software interface. Simply connect your PC through a serial interface to the HART loop and all functionality can be accessed quickly, conveniently, and safely.

Refer to PACT***ware*** bulletins 59-101 and 59-601 for more information.

APPLICATIONS

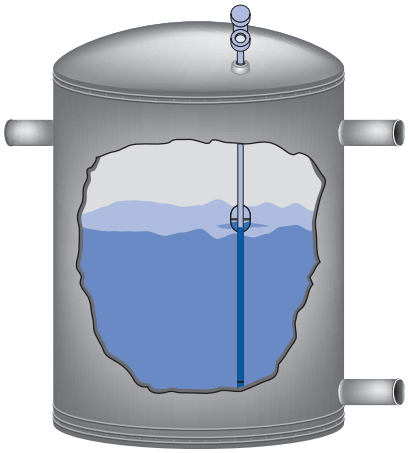
The Enhanced Jupiter transmitter is designed for mounting directly to new or existing Orion Atlas, Aurora, Gemini, and many competitor's magnetic level indicators or can be inserted directly into the process vessel.

EXTERNALLY MOUNTED TO ATLAS CHAMBER



For applications with process temperatures up to +850° F (+455° C)

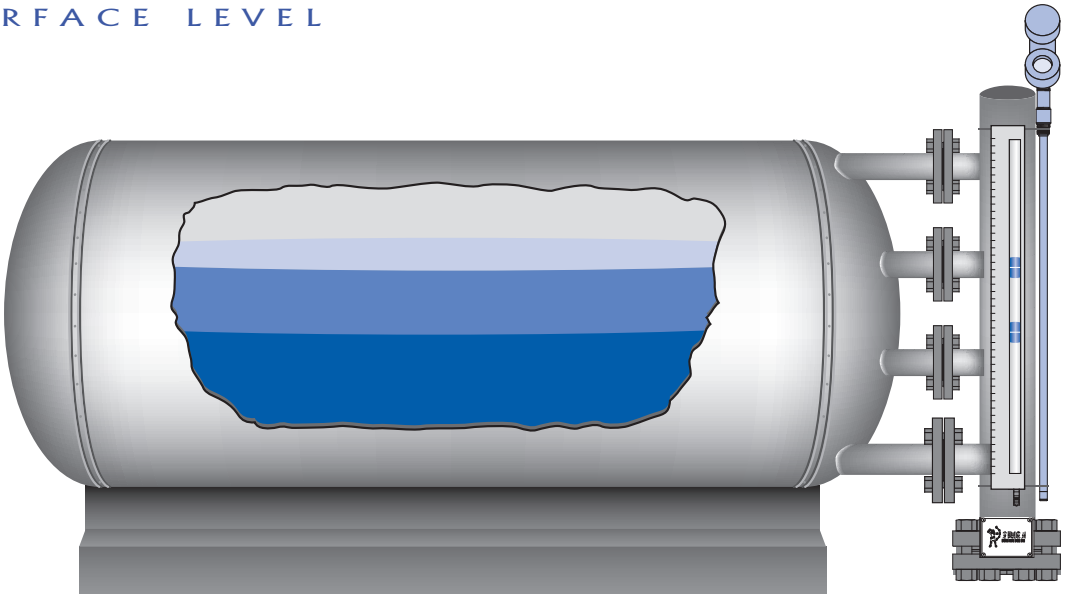
DIRECT INSERTION



316/316L stainless steel, Hastelloy C 276, and Monel probes available

For applications with process temperatures up to +500° F (+260° C)

EXTERNALLY MOUNTED INTERFACE LEVEL



Jupiter displays overall level and interface level when equipped with two floats

Two-float option is also available with direct insertion model

AGENCY APPROVALS

AGENCY	MODEL	PROTECTION METHOD	AREA CLASSIFICATION
FM & CSA	2X1-XXXXXXX-XXX 2X2-XXXXXXX-XXX 2X3-XXXXXXX-XXX 2X4-XXXXXXX-XXX	Intrinsically Safe	Class I, Div. 1: Groups A, B, C, & D Class II, Div. 1: Groups E, F, & G Class III, IP66 TYPE 4X, T4 @80°C Entity
	2XX-XXXXXXX-XXX	Explosion Proof ①	Class I, Div. 1 Groups B, C, & D Class II, Div. 1 Groups E, F, & G Class III, IP66 Type 4X T5 @80°C
	2XX-XXXXXXX-XXX	Non-Incendive	Class I, Div. 2 Groups A, B, C, & D Class II, Div. 2 Groups E, F, & G ② Class III, IP66 Type 4X T5
ATEX	2XA-XXXXXXX-XXX 2XB-XXXXXXX-XXX 2XC-XXXXXXX-XXX 2XD-XXXXXXX-XXX	Flame Proof	⟨Ex⟩ II 1/2 G EExd IIC T6 @70°C
	2XE-XXXXXXX-XXX 2XF-XXXXXXX-XXX 2XG-XXXXXXX-XXX 2XH-XXXXXXX-XXX	Intrinsically Safe ③	⟨Ex⟩ II 1 G EEx ia IIC T4 @70°C FISCO

① M20 conduit connections not CSA approved explosion proof

② FM approval Class II, Div. 2 Groups F & G only

③ Materials marked as category I equipment and used in hazardous areas requiring this category, shall be installed in such a way that, even in the event of rare incidents, the aluminum enclosure cannot be an ignition source due to impact or friction.

SPECIFICATIONS

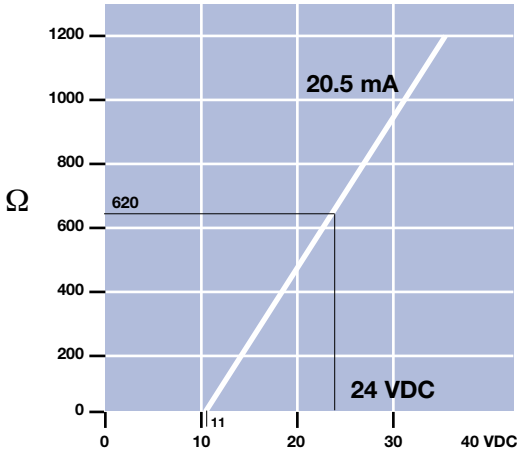
PERFORMANCE

Accuracy		±0.015"
Repeatability		±0.005% of full span or 0.005" (0.127 mm) (whichever is greater)
Linearity		0.020% of full span or 0.031" (0.794 mm) (whichever is greater)
Maximum level rate of change		6 inches per second (models with HART)
Response time		0.1 second
Warm-up		<5 second
Upper dead zone		None
Lower dead zone		<2" (5 cm), SIL 2: <5" (13 cm)
Ambient temperature range	Transmitter:	-40° to +175° F (-40° to +80° C)
	LCD:	-10° to +160° F (-20° to +70° C)
Process temperature	External Mount:	-40° to +248° F (-40° to +120° C)
		-320° to +850° F (-195° to +455° C) (with factory insulated MLI)
	Direct Insertion:	-40° to +200° F (-40° to +95° C)
		-40° to +500° F (-40° to +260° C) (high temperature probe)
Humidity		0 to 99% non-condensing
Electromagnetic compliance		EN 61326
Environmental protection compliance		EN 60654-1
Drop protection compliance		EN 50178
Surge Protection Compliance		EN 61326 (1000 V)
Maximum Pressure (Direct Insertion)		1700 psig @ +100° F (117 bar @ +38° C) (limited to the pressure rating of the selected flange or float)

SPECIFICATIONS
FUNCTIONAL

Measured variables		Continuous liquid level
Input power (at terminals)		12-28 VDC
Signal output ①		4–20 mA
		4–20 mA with HART 5.0
		NAMUR NE 43 compliant with 3.8 to 21.5 mA useable range
Loop resistance		620 maximum ohms @ 24 VDC—refer to chart below
Power consumption		0.7 watt, refer to chart below
Damping		0 to 25 seconds
Error signal		3.6 or 22 mA, field selectable
User interface		3-button keypad, HART communicator, AMS software, PACT*ware*
		or FOUNDATION Fieldbus
Display		2-line × 8-character LCD in inches or cm, mA, and % of level
Resolution	Analog:	0.01 mA
	Digital:	0.01 units
Span		6 to 400 inches (999 cm)
SIL 2		Safe Failure Fraction (SFF) 90.7% (consult factory for SIL safety manual)

① See Bulletin 46-649 for Foundation Fieldbus output



Power Consumption

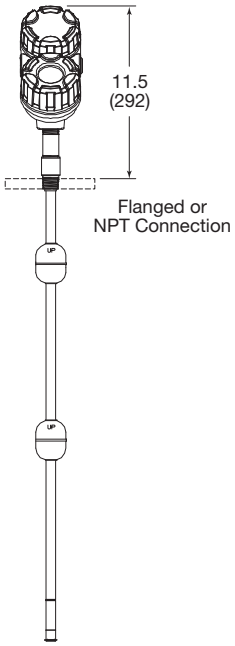
SPECIFICATIONS
PHYSICAL

Enclosure type	Dual compartment
Enclosure material	Sand cast aluminum grade 356 HT or 316 stainless steel
Enclosure finish	Baked on polymer powder coat
Enclosure rating	NEMA 4X7/9, IP 66
Sensor material	316 stainless steel
Sensor length	6 to 400 inches (15 to 999 centimeters)

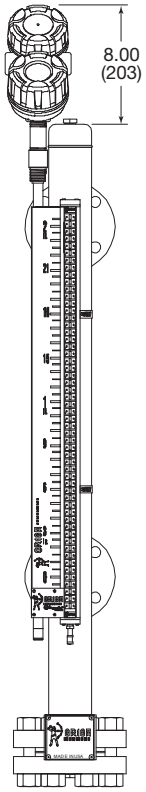
SPECIFICATIONS

PHYSICAL

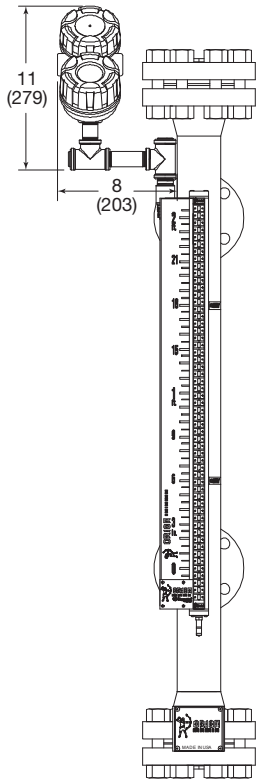
Typical Dimensions
Inches (mm)



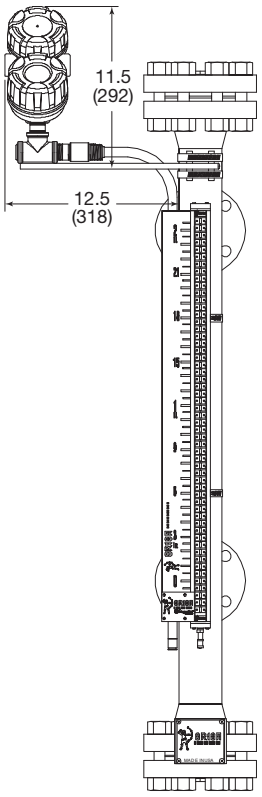
Direct Insertion



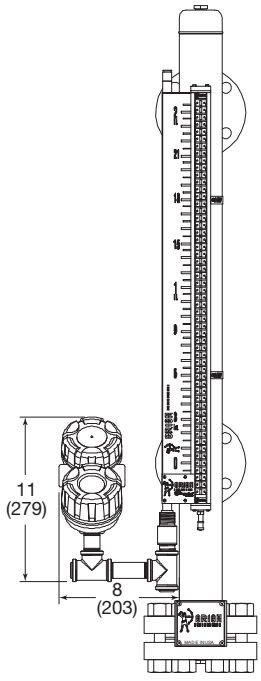
Top Mount



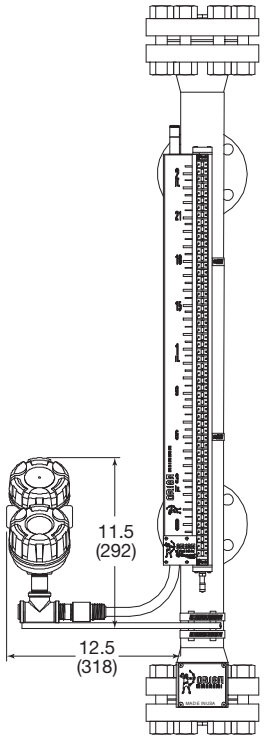
Top Mount Offset



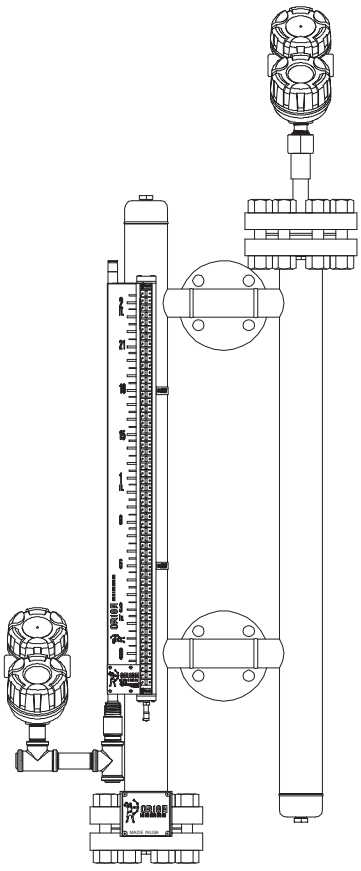
Top Mount Offset
High Temperature Bend



Bottom Mount Offset



Bottom Mount Offset
High Temperature Bend



Gemini – Bottom Mount Offset
and Secondary Transmitter

MODEL NUMBER

ENHANCED JUPITER MAGNETOSTRICTIVE TRANSMITTER

TRANSMITTER TYPE

2	Enhanced Jupiter Magnetostrictive

OUTPUT

4	LCD display, 4–20 mA & HART, SIL 1
5	LCD display & FOUNDATION Fieldbus™
6	LCD display, 4–20 mA & HART, SIL 2 ①
7	Interface transmitter, 4–20 mA & HART, with LCD display, 2 floats
8	Interface transmitter, FOUNDATION Fieldbus, with LCD display, 2 floats

HOUSING MATERIAL, MOUNTING AND CONDUIT ENTRY

1	Cast Aluminum, Integral Mount with ¾" NPT Conduit Entry	FM/CSA, EP, NI & IS
2	Cast Aluminum, Integral Mount with M20 Conduit Entry	FM, EP, NI & IS
3	316 SS, Integral Mount with ¾" NPT Conduit Entry	FM/CSA, EP, NI & IS
4	316 SS, Integral Mount with M20 Conduit Entry	FM, EP, NI & IS
A	Cast aluminum, Integral Mount with ¾" NPT conduit entry	ATEX, EEx d
B	Cast aluminum, Integral Mount with M20 conduit entry	ATEX, EEx d
C	316 SS, Integral Mount with ¾" NPT conduit entry	ATEX, EEx d
D	316 SS, Integral Mount with M20 conduit entry	ATEX, EEx d
E	Cast aluminum, Integral Mount with ¾" NPT conduit entry	ATEX, EEx ia
F	Cast aluminum, Integral Mount with M20 conduit entry	ATEX, EEx ia
G	316 SS, Integral Mount with ¾" NPT conduit entry	ATEX, EEx ia
H	316 SS, Integral Mount with M20 conduit entry	ATEX, EEx ia

CONFIGURATION (see drawings on page 7)

D	Direct Insertion, Construction codes 1 through 7
E	Top Mount, Construction code 1
F	Top Mount Offset, Construction code 1
G	Top Mount Offset, high-temperature bend, Construction code 7
H	Bottom Mount Offset, Construction code 1
J	Bottom Mount Offset, high-temperature bend, Construction code 7

MATERIALS OF CONSTRUCTION

1	316/316L SS (standard), +250° F (+120° C) Maximum (Direct Insertion +200° F (+95°))
7	316/316L SS (high temperature) +500° F (+260° C) Maximum ②
2	Hastelloy C, +200° F (+95° C) Maximum ③
3	Monel, +200° F (+95° C) Maximum ③
5	Electropolished 316/316L SS, +200° F (+95° C) Maximum ③
6	Sanitary 316/316L SS, +200° F (+95° C) Maximum ③

MOUNTING CONNECTION

See page 9

FLOAT

See page 10

PROBE UNITS

E	Inches
M	Centimeters

PROBE LENGTH

See page 10

2			—								—			

① The bottom 3 inches of SIL 2 direct insertion probes are inactive. The inactive area is used to detect float failure.

② Consult factory for process temperatures of 500°–850° F (260°–455° C)

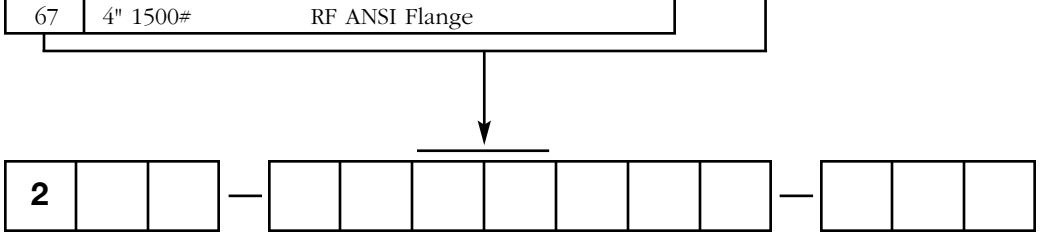
③ Direct insertion model only. Consult factory for process temperatures above +200° F (+95° C)

MODEL NUMBER

ENHANCED JUPITER MAGNETOSTRICTIVE TRANSMITTER

MOUNTING CONNECTION

00	None, defines external mount	
11	¾" NPT thread	
22	1" BSP thread	
23	1" 150#	RF ANSI Flange
24	1" 300#	RF ANSI Flange
25	1" 600#	RF ANSI Flange
27	1" 900/1500#	RF ANSI Flange
28	1" 2500#	RF ANSI Flange
2M	1" 900/1500#	RTJ ANSI Flange
2N	1" 2500#	RTJ ANSI Flange
33	1½" 150#	RF ANSI Flange
34	1½" 300#	RF ANSI Flange
35	1½" 600#	RF ANSI Flange
37	1½" 900/1500#	RF ANSI Flange
38	1½" 2500#	RF ANSI Flange
3K	1½" 600#	RTJ ANSI Flange
3M	1½" 900/1500#	RTJ ANSI Flange
3N	1½" 2500#	RTJ ANSI Flange
3P	1", 1½" 3A	Triclamp (Material Code 6 only)
41	2" NPT thread	
43	2" 150#	RF ANSI Flange
44	2" 300#	RF ANSI Flange
45	2" 600#	RF ANSI Flange
47	2" 900/1500#	RF ANSI Flange
48	2" 2500#	RF ANSI Flange
4K	2" 600#	RTJ ANSI Flange
4M	2" 900/1500#	RTJ ANSI Flange
4N	2" 2500#	RTJ ANSI Flange
4P	2" 3A	Triclamp (Material Code 6 only)
53	3" 150#	RF ANSI Flange
54	3" 300#	RF ANSI Flange
55	3" 600#	RF ANSI Flange
56	3" 900#	RF ANSI Flange
57	3" 1500#	RF ANSI Flange
58	3" 2500#	RF ANSI Flange
5K	3" 600#	RTJ ANSI Flange
5L	3" 900#	RTJ ANSI Flange
5M	3" 1500#	RTJ ANSI Flange
5N	3" 2500#	RTJ ANSI Flange
5P	3" 3A	Triclamp (Material Code 6 only)
63	4" 150#	RF ANSI Flange
64	4" 300#	RF ANSI Flange
65	4" 600#	RF ANSI Flange
66	4" 900#	RF ANSI Flange
67	4" 1500#	RF ANSI Flange
68	4" 2500#	RF ANSI Flange
6K	4" 600#	RTJ ANSI Flange
6L	4" 900#	RTJ ANSI Flange
6M	4" 1500#	RTJ ANSI Flange
6N	4" 2500#	RTJ ANSI Flange
6P	4" 3A	Triclamp (Material Code 6 only)
BA	DN25 PN16	DIN 2527 Form B Flange
BB	DN25 PN25/40	DIN 2527 Form B Flange
BC	DN25 PN64/100	DIN 2527 Form E Flange
BF	DN25 PN160	DIN 2527 Form E Flange
BG	DN25 PN250	DIN 2527 Form E Flange
BH	DN25 PN320	DIN 2527 Form E Flange
BJ	DN25 PN400	DIN 2527 Form E Flange
CA	DN40 PN16	DIN 2527 Form B Flange
CB	DN40 PN25/40	DIN 2527 Form B Flange
CC	DN40 PN64/100	DIN 2527 Form E Flange
CF	DN40 PN160	DIN 2527 Form E Flange
CG	DN40 PN250	DIN 2527 Form E Flange
CH	DN40 PN320	DIN 2527 Form E Flange
CJ	DN40 PN400	DIN 2527 Form E Flange
DA	DN50 PN16	DIN 2527 Form B Flange
DB	DN50 PN25/40	DIN 2527 Form B Flange
DD	DN50 PN64	DIN 2527 Form E Flange
DE	DN50 PN100	DIN 2527 Form E Flange
DF	DN50 PN160	DIN 2527 Form E Flange
DG	DN50 PN250	DIN 2527 Form E Flange
DH	DN50 PN320	DIN 2527 Form E Flange
DJ	DN50 PN400	DIN 2527 Form E Flange
EA	DN80 PN16	DIN 2527 Form B Flange
EB	DN80 PN25/40	DIN 2527 Form B Flange
ED	DN80 PN64	DIN 2527 Form E Flange
EE	DN80 PN100	DIN 2527 Form E Flange
EF	DN80 PN160	DIN 2527 Form E Flange
EG	DN80 PN250	DIN 2527 Form E Flange
EH	DN80 PN320	DIN 2527 Form E Flange
EJ	DN80 PN400	DIN 2527 Form E Flange
FA	DN100 PN16	DIN 2527 Form B Flange
FB	DN100 PN25/40	DIN 2527 Form B Flange
FD	DN100 PN64	DIN 2527 Form E Flange
FE	DN100 PN100	DIN 2527 Form E Flange
FF	DN100 PN160	DIN 2527 Form E Flange
FG	DN100 PN250	DIN 2527 Form E Flange
FH	DN100 PN320	DIN 2527 Form E Flange
FJ	DN100 PN400	DIN 2527 Form E Flange



MODEL NUMBER
ENHANCED JUPITER MAGNETOSTRICTIVE TRANSMITTER

FLOAT

The floats listed below are suitable for most applications. Consult factory for custom floats. For models with 2 floats, choose top float below, then consult factory for second float selection. For externally mounted models use float code "00".

DIRECT INSERTION TOTAL LEVEL FLOAT SELECTION

Minimum Liquid Specific Gravity	**316/316L SS** diameter × length	**Titanium** diameter × length	**Hastelloy C** diameter × length	**316/316L SS Sanitary** diameter × length
0.84	**AA** 2" × 2.75" float (50 × 70 mm)	**BA** 2.00" × 2.75" float (50 × 70 mm)	**CA** 1.85" × 3.00" float (47 × 76 mm)	**DA** 2.00" × 2.75" float (50 × 70 mm)
0.70	**AB** 2.30" × 3.00" float (58.5 × 76 mm)	**BA** 2.00" × 2.75" float (50 × 70 mm)	**CB** 2.30" × 3.00" float (58.5 × 76 mm)	**DB** 2.30" × 3.00" float (58.5 × 76 mm)
0.64	**AC** 2.55" × 3.00" float (65 × 76 mm)	**BB** 2.30" × 3.00" float (58.5 × 76 mm)	Custom float ordered separately	Custom float ordered separately
0.52	Custom float ordered separately	**BB** 2.30" × 3.00" float (58.5 × 76 mm)	Custom float ordered separately	Custom float ordered separately

DIRECT INSERTION INTERFACE LEVEL FLOAT SELECTION

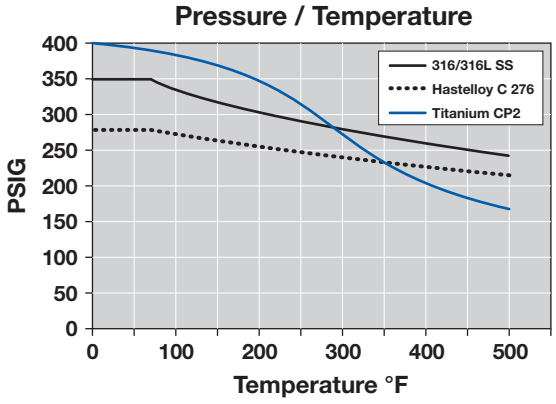
Minimum Liquid Specific Gravities A/B	**316 SS** (diameter × length)	**Titanium** (diameter × length)	**Hastelloy C** (diameter × length)	**316L SS** (diameter × length)
.89/1.00 ①	**MA** 2.00" × 2.75" float (50 × 70 mm)	**NA** 2.00" × 2.75" float (50 × 70 mm)	**PA** 1.85" × 3.00" float (47 × 76 mm)	**QA** 2.00" × 2.75" float (50 × 70 mm)
1.00/1.12 ①	**MB** 2.00" × 2.75" float (50 × 70 mm)	**NB** 2.30" × 3.00" float (58.5 × 76 mm)	**PB** 1.85" × 3.00" float (47 × 76 mm)	**QB** 2.00" × 2.75" float (50 × 70 mm)

OTHER FLOAT SELECTION

00	No float when used with MLI
	Custom float—consult factory

PROBE LENGTH ②

Specify measuring range in: Inches when tenth digit is Code "E", lengths from 6 to 400 inches Inch Code Example: 24 inches = Code 024
Specify measuring range in: Centimeters when tenth digit is Code "M", lengths from 15 to 999 cm Centimeter Code Example: 60 cm = Code 060



① Float is weighted to sink through specific gravity A and float on specific gravity B

② The bottom 3 inches of SIL 2 direct insertion probes are inactive. The inactive area is used to detect float failure.

2			—									—										

DIRECT INSERTION ENHANCED JUPITER TRANSMITTER
APPLICATION DATA SHEET

Customer / Orion Representative	
Quote Reference #	Contact Phone #
E-mail Address	

Jupiter Model Number

2 ☐☐–☐☐☐☐☐☐☐–☐☐☐

Media Specific Gravity: _____
TOTAL & INTERFACE LEVEL (IF REQUIRED)

Maximum Operating Pressure _____

Maximum Operating Temperature _____

Low Level Set-Point: _____
(4 mA or 0% span) FROM THE TIP OF THE SENSOR TUBE

High Level Set-Point: _____
(20 mA or 100% span) FROM THE TIP OF THE SENSOR TUBE

Turbulent or agitated liquid surface ☐ Yes ☐ No

Flowing or vortexing conditions ☐ Yes ☐ No

Vibration present ☐ Yes ☐ No

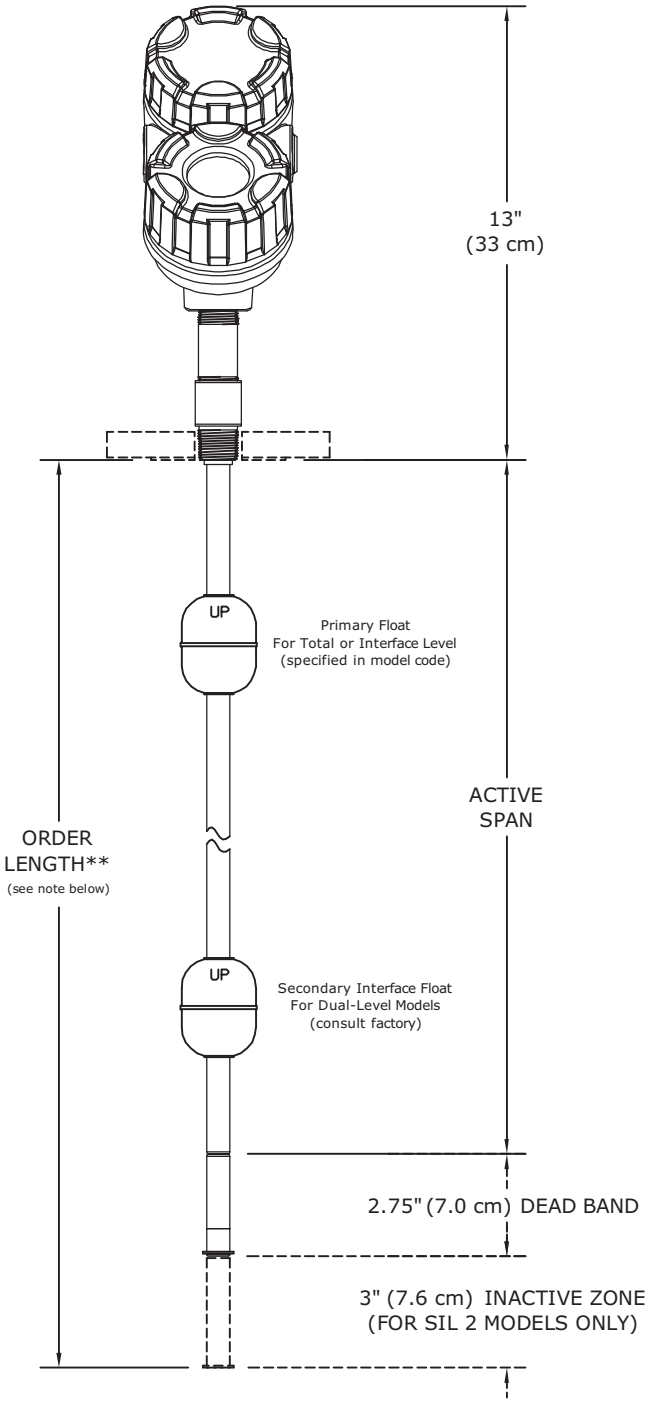
IMPORTANT INFORMATION REGARDING SIL 2 COMPLIANT MODELS

IF SIL 2 CONSTRUCTION IS REQUIRED, A 3" (7.6 cm) INACTIVE SECTION MUST BE ADDED AT THE END OF THE PROBE IN ORDER FOR THE FLOAT TO TRAVEL OUT OF THE ACTIVE SPAN IN THE EVENT OF A FAILURE.

THE 3" (7.6 cm) INACTIVE DIMENSION IS CONTINGENT ON THE USE OF A STANDARD FLOAT. IF A CUSTOM FLOAT DESIGN IS REQUIRED THIS EXTENSION MAY INCREASE.

IMPORTANT INFORMATION REGARDING FLOAT DESIGN

STANDARD FLOATS INCLUDE A 1.5x SAFETY FACTOR INCORPORATED IN THE PRESSURE RATING.



** IF SIL 2 COMPLIANCE IS NOT REQUESTED, DISREGARD THE 3" (7.6 cm) INACTIVE ZONE WHEN SPECIFIYING THE ORDER LENGTH.

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